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ABSTRACT

Research and analysis conducted to determine the effects of reducing the administration time for one or more levels of the Basic Occupational Literacy Test (BOLT) are described. The total usable sample consisted of 2,423 subjects. Data were collected from 23 states from 1978 to 1981. Data came from a variety of sources, including schools and training programs of all types. The Advanced and Fundamental BOLT subtests were divided into six batteries, and sampled states were assigned a battery to collect data with minimum collection goals to ensure inclusion of sex, race, and economic-level minorities. Correlations among Brief Time Form A, Brief Time Form B, Standard Time Form B, and the appropriate Wide Range Scale Score were calculated for eight content/level groups. Subjects were administered the appropriate subtest Form A with half the standard time limit and Form B with half the limit. Then the remaining half of the time limit was given for the same Form B. Results of t-test analyses revealed a significant effect on total group mean scores between brief and standard time limits for Battery I--Reading Vocabulary, Advanced; Battery I--Reading Comprehension, Advanced; and Battery III--Arithmetic Reasoning, Advanced. Analysis of variance indicated a significant adverse effect on minority groups for the calculated difference between brief and standard scores for three of the subtests. Considering the results of the analysis for all four BOLT subtests, no reduction in time limits can be recommended. Thirty-four tables give study results. (SLD)

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THE SPEED-POWER STUDY OF THE USES BASIC OCCUPATIONAL LITERACY TEST (BOLT) ANALYSIS AND REPORT

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The Speed-Power Study of the USES Basic Occupational Literacy Test (BOLT)

Analysis and Report

Summary

This report describes the research and analysis conducted to determine the affects of reducing the administration time for one or more levels of the Basic Occupational Literacy Test (BOLT). Results of the t-test analyses have shown a significant affect on total group mean scores between brief and standard time limits for Battery I - Reading Vocabulary, Advanced level; Battery I - Reading Comprehension, Advanced level; Battery III - Arithmetic Reasoning, Advanced level. Analysis of variance analysis has shown a significant adverse effect on minority groups for the calculated difference between Brief and Standard scores (Standard Time Raw Score - Brief Time Raw Score) for Battery I - Reading Vocabulary, Advanced level; Battery III - Arithmetic Reasoning, Advanced level; and Battery IV - Reading Vocabulary, Fundamental level. Considering the findings of the data analysis for all four BOLT sub-tests, no reduction in time limits can be recommended.

Procedure

The Advanced and Fundamental BOLT subtests were divided into six groups, or batteries, and test research states were assigned a battery to collect sample based on Wide Range Scale Scores and Educational levels of individuals. Each state was originally assigned minimum sample collection goals with quotas to submit 50% for each sex, race (minority/non-minority), and economic level for the advanced batteries. Only sex and race quotas were assigned for the Fundamental batteries. After scoring the Wide Range Scales and assigning each individual to the appropriate subtest level, participants were administered Form A with half the Standard Time limit. Immediately after Form A Administration, Form B of the same subtest was administered with half the Standard Time limit. Finally, after exchanging pencils to a different color, the remaining half of the Standard Time limit was given for the same Form B.
(See Appendix I, Study Design, for complete procedure information.)

Sample Description

The total useable sample consisted of 2,423 subjects. Data were collected nationally from the following states: Alabama, Arkansas, California, Colorado, Florida, Illinois, Louisiana, Massachusetts, Mississippi, Missouri, Nebraska, Nevada, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, Tennessee, West Virginia, and Wisconsin. Data for this study were collected from 1978 to 1981. Data were collected from a large variety of sources, including the following: Adult Basic Education classes, CETA training programs of all types, four year colleges, two year community/technical colleges, community retardation centers, high schools, local Job Service offices' "walk-in" traffic, local office plant staffings, Job Corps Centers, prisons and WIN programs.

Data were reviewed for completeness prior to inclusion in the various batteries. Excluded from sample inclusion was data deemed to be inappropriate based on sample submittal reports. Some states submitted all collected data with

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comments about specific sample members. These comments were reviewed and inappropriate subjects were removed from data analysis. One state had allowed the sample members to leave the room (for recess) after they had completed their test during the "standard time" period. It was felt that peer pressure could have influenced the sample members to leave prior to demonstrating their true achievement score. Therefore, the entire state sample was deemed inappropriate for research. Some states gave their assigned battery regardless of the stated educational level and Wide Range Scale Score of the sample member, and then submitted the entire sample. Other states submitted data for their assigned battery with only a few sample members who would not be included using the published BOLT Level Grid. Information gathered in a counseling interview or by observations made while the Wide Range Scale is being administered should be considered in interpreting the performance on the Wide Range Scale and the assignment of the appropriate level of the test to be administered. Data from all states were deemed appropriate for sample inclusion using a Modified BOLT Level Grid (Table 1). The evaluation of submitted data and the removal of inappropriate subjects resulted in sample sizes smaller than those specified in the design. Table 2 shows the composition by race, sex, age group, economic status, and the total sample size by Battery. Table 3 shows calculated means for age, educational level, Wide Range Scale Scores, Form A Brief Time Limit Score, Form B Brief Time Limit Score, and Form B Standard Time Limit Score on each Battery. Tables 4 through 7 show the means by race, sex, age group, and economic status for each Battery.

Analysis

Correlations between Brief Time Form A, Brief Time Form B, Standard Time Form B, and the appropriate Wide Range Scale Score, were performed for all eight of the content/level groups (Tables 8 through 15). Correlation coefficients were as follows: Form A Brief to Form B Brief ranged from .68 to .89, Form B Brief to Form B Standard ranged from .82 to .99, and Form B Brief to appropriate Wide Range Scale Score ranged from .30 to .60. All correlation coefficients are positive and all are significant to the .0001 level. These correlation coefficients indicate that 1) there is adequate alternate form reliability for the Brief Time Limits, and 2) there is significant comparability of scores between brief and standard time limits. An intercorrelation between Reading Vocabulary, and Reading Comprehension can be calculated (Table 16). An intercorrelation between Arithmetic Computation and Arithmetic Reasoning can not be calculated because these scores were obtained from different sample members. Scatter plots were developed for all eight of the content/level groups. As indicated by the correlation coefficients, they are all positive in direction and appear linear in fashion.

An Analysis of Variance was also computed for Brief Time, Standard Time, and the Difference Between Brief and Standard Time for each of the six batteries to evaluate the main and interaction effects of the demographic variables. A four-way ANOVA (Age X Sex X Race X Economic Status) was computed for the advance level batteries, and a three-way ANOVA (Age X Sex X Race) was computed for the Fundamental Level batteries. Age was grouped into three categories: Under 22, 22-44, Over 44. The overall model results were significant for almost all of the Advanced level batteries and a few of the Fundamental level batteries (Table 17). Type IV Sums of Squares were used to determine which main and interaction effects of the demographic variables were the significant source of the overall significance levels (Tables 18 - 25). The Brief-Standard score difference ANOVA's are of primary importance in determining if a reduction in

test administration time will create a systematic influence based on demographic variables. For Battery I Reading Vocabulary, Advanced Level; Battery III, Arithmetic Reasoning, Advanced Level; and Battery IV Reading Vocabulary, Fundamental Level, the main effect of ETHNIC was the significant effect. For Battery IV, Reading Vocabulary, Fundamental Level, the interaction effect on Age and Ethnic was significant. For Battery III Arithmetic Reasoning, Advanced Level, the interaction effects of Sex* Economic Status, Age* Sex* Economic Status, and Sex* Ethnic* Economic Status was significant.

A Posteriori Contrast Test, the Duncan Multiple Range Test, was also computed for all of the Brief-Standard Score Differences Means for the variables: Age, Sex, Economic Status, and Race on all batteries (Tables 26 through 33). The demographic variables Age was divided into three categories: Under 22, 22-44, over 44. The under 22 group gained significantly less than the other two during the additional time for Battery III, Arithmetic Reasoning, Advanced Level, and the over 44 group gained significantly more than the other two during the additional time for Battery V, Arithmetic Computation, Fundamental Level. All other mean differences between the Age groups for all of the Batteries were not significant.

The Duncan Multiple Range test for the variable sex indicated a significant difference for Battery III, Arithmetic Reasoning, Advanced Level where females gained significantly more than males during the standard time limit. All other mean score difference between the groups, for all of the Batteries, were not significant.

Because of an assumption of possible test bias the demographic variable Economic Status was obtained for the Advanced Level test batteries. The Duncan's indicated that two of the four batteries (Battery I, Reading Comprehension, Advanced Level, and Battery II, Arithmetic Computation, Advanced Level) had significant differences between the Brief and Standard Time Score Means. For Battery I, Reading Comprehension, Advanced Level, the disadvantaged gained significantly more than the non-disadvantaged. For Battery II, Arithmetic Computation, Advanced Level, the non-disadvantaged gained significantly more than the disadvantaged.

Duncan analysis considered all five race groups in the mean score comparison. It showed that Blacks gained significantly more (given the extra Standard Time) than non-minorities in Battery I, Reading Vocabulary, Advanced Level; Battery I, Reading Comprehension, Advanced Level; and Battery III, Arithmetic Reasoning, Advanced Level. For Battery V, Arithmetic Computation, Fundamental Level, non-minorities gained significantly more than Blacks. Due to very small sample sizes, Duncan test results for the Oriental, American Indian, and Hispanic ethnic groups are inconclusive.

Mean scores under Brief and Standard Time Limits were computed for each Wide Range Score/education level combination. The modified BOLT Level Grid was used to establish the various score/education level combinations. The differences appeared linear and uniform in direction.

t-tests were calculated to determine if significant differences existed between the Brief Time Score and Standard Time Score Means for each Battery (Table 34). Using the formula assuming unknown but equal population variance,

all of the Advanced Level Batteries: Battery I - Reading Vocabulary and Reading Comprehension, Battery II - Arithmetic Computation, and Battery III - Arithmetic Reasoning had significant Mean Differences. These Mean Differences ranged from .3 of a raw score point to 2.5 raw score points. Some of the Fundamental Batteries had larger Mean Score Differences, however, due to smaller total sample sizes and larger standard deviations the difference between the Brief and Standard Time Means was not significant.

CONCLUSIONS

Use of the Modified BOLT Level Grid may have affected the results of this study. This may have allowed individuals who should have taken the Basic Intermediate test to be included in the Fundamental Level sample. This could moderate the results of the Fundamental Level Batteries. The Modified Grid may have also allowed inclusion of individuals who might have been given the High Intermediate Level to be included in the Advanced Level Batteries. This could magnify the results of the Advanced Level Batteries.

Analysis was done on Brief Time Limit Scores, Standard Time Limit Scores, and the computed difference or "gain" between the Brief and Standard Time Limits. The difference between Brief and Standard Time Limit Scores for all batteries was considered crucial to the evaluation of demographic variables. For example, two groups begin at the same starting point, have significantly different mid-point scores, and finish with significantly different ending point scores. If the groups "gain" or advance equally between the mid-point and ending point, then either the mid-point score or the ending point score could be used as a reference score. However, if the "gain" or difference is not equal for the two groups, then one group would be penalized by using the mid-point score as the reference score for conclusion about the group. This is the basis for analyzing the difference between Brief and Standard Scores to see if the differences are equal and uniform.

The use of Mean Raw Score change between the Brief and Standard Time Limits may not account for all of the statistical artifacts that may be present; however, it does provide an arithmetic difference and thus a comparison of the Means.

Based on the t-test analysis of the difference between the Means (Table 34), the additional time was significantly (.05) utilized by the Advanced Level Battery sample members. The highly significant Batteries were: Battery I - Reading Comprehension, Advanced Level and Battery II - Arithmetic Computation, Advanced Level. Observations during the test sessions appear to indicate that the length of the Reading Comprehension passages and the length of the Arithmetic Computation calculations were reasons for the use of the additional time. Individuals' performance on the lowest level of BOLT subtests, however, were not significantly affected by the reduction in time limits, disproving the hypothesis in the study design that the lowest level performers would be adversely affected by the reduced time limits.

The Duncan Multiple Range Test indicated that the Black sub-sample for Battery I - Reading Vocubulary, Advanced Level; Battery I - Reading Comprehension Advanced Level; and Battery III Arithmetic Reasoning, Advanced Level, were

using the Standard Time Limits to their advantage and to use the Brief Time Limits would adversely effect them.

Considering the findings of the data analysis for all four BOLT sub-tests, no reduction in time limits can be recommended.

TABLE 1

Modified BOLT Level Grid

Stated Educational Level Achieved	Wide Range Scale Score	Test Booklet Assignment	Battery Assignment
6 grade or less	7-8	Reading Vocabulary and Reading Comprehension, Advanced Level	Battery I
7 grade or higher	7-8		
6 grade or less	7-8	Arithmetic Computation Advanced Level	Battery II
7 grade or higher	6-8		
6 grade or less	6-8	Arithmetic Reasoning, Advanced Level	Battery III
7 grade or higher	4-8		
6 grader or less	0-5	Reading Vocabulary and Reading Comprehension, Fundamental Level	Battery IV
7 grade or higher	0-3		
6 grade or less	0-6	Arithmetic Computation Fundamental Level	Battery V
7 grade or higher	0-5		
6 grade or less	0-5	Arithmetic Reasoning Fundamental Level	Battery VI
7 grade or higher	0-3		

TABLE 2

Sample Characteristics by Battery

	Total Sample Number	RACE					SEX		AGE			ECONOMIC STATUS	
		Non-Min.	Black	Oriental	American Indian	Hispanic	Male	Female	Under 22	22-44	Over 44	Non-Dis.	Disadvantaged
BAT. 1 (RV Adv.)	493	212	170	0	11	100	233	260	158	290	45	197	296
BAT. 1 (RC Adv.)	493	212	170	0	11	100	233	260	158	290	45	197	296
BAT. 2 (AC Adv.)	664	389	207	4	3	61	282	382	217	399	48	326	338
BAT. 3 (AR Adv.)	661	404	181	11	12	53	309	352	285	314	62	325	336
BAT. 4 (RV Fun.)	209	84	109	1	3	12	107	102	106	80	23	*	*
BAT. 4 (RC Fun.)	209	84	109	1	3	12	107	102	106	80	23	*	*
BAT. 5 (AC Fun.)	278	119	145	2	1	11	153	125	108	141	29	*	*
BAT. 6 (AR Fun.)	118	53	60	1	1	3	62	56	50	53	15	*	*

*Economic Status Not Required in the Design for these Batteries.

TABLE 3

Means by Battery

	Age	Education	Wide Range Scale Score Vocabulary	Wide Range Scale Score Arithmetic	Form A Brief Time	Form B Brief Time	Form B Standard Time
BAT 1 (RV Adv.)	28.3	11.44	7.48	-	10.17	10.88	11.29
BAT 1 (RC Adv.)	28.3	11.44	7.48	-	7.57	8.20	9.32
BAT 2 (AC Adv.)	27.8	11.39	-	7.19	6.74	5.77	8.28
BAT 3 (AR Adv.)	27.1	11.18	-	7.03	7.68	7.16	7.54
BAT 4 (RV Fun.)	27.0	9.10	2.2	-	8.87	9.44	9.76
BAT 4 (RC Fun.)	27.0	9.10	2.2	-	6.57	6.81	7.32
BAT 5 (AC Fun.)	27.6	8.59	-	2.86	9.92	10.72	11.26
BAT 6 (AR Fun.)	27.4	8.30	-	1.92	5.55	5.96	6.12

TABLE 4

Means by Race

	Sub Sample Size	Wide Range Scale Score Vocabulary	Wide Range Scale Score Arithmetic	Form A Brief Time	Form B Brief Time	Form B Standard Time
BAT 1 (RV Adv.)						
Non-Minority	212	7.58	-	11.33	11.90	12.15
Black	170	7.34	-	9.26	9.97	10.70
Oriental	0	-	-	-	-	-
Am. Ind.	11	7.27	-	9.36	9.64	9.64
Hispanic	100	7.53	-	9.37	10.43	10.67
BAT 1 (RC Adv.)						
Non-Minority	212	7.58	-	8.35	8.99	9.96
Black	170	7.34	-	7.02	7.51	8.86
Oriental	0	-	-	-	-	-
Am. Ind.	11	7.27	-	6.45	7.45	8.09
Hispanic	100	7.53	-	6.95	7.78	8.88
BAT 2 (AC Adv.)						
Non-Minority	389	-	7.22	7.61	6.53	9.02
Black	207	-	7.16	5.17	4.48	6.91
Oriental	4	-	7.50	9.50	8.00	9.50
Am. Ind.	3	-	6.00	4.33	4.67	6.00
Hispanic	61	-	7.18	6.48	5.20	8.26
BAT 3 (AR Adv.)						
Non-Minority	404	-	7.07	8.46	7.91	8.16
Black	181	-	6.98	6.04	5.66	6.27
Oriental	11	-	7.64	9.73	9.27	9.45
Am. Ind.	12	-	6.58	7.67	5.42	6.00
Hispanic	53	-	6.87	6.85	6.51	7.11
BAT 4 (RV Fun.)						
Non-Minority	84	2.32	-	9.24	9.90	10.38
Black	109	2.08	-	8.39	8.86	9.16
Oriental	1	1.00	-	6.00	11.00	11.00
Am. Ind.	3	2.33	-	10.33	10.67	9.33
Hispanic	12	2.50	-	10.58	11.00	10.83
BAT 4 (RC Fun.)						
Non-Minority	84	2.32	-	6.79	6.98	7.64
Black	109	2.08	-	6.30	6.50	6.90
Oriental	1	1.00	-	10.00	11.00	12.00
Am. Ind.	3	2.33	-	7.67	8.00	7.67
Hispanic	12	2.50	-	6.92	7.92	8.33
BAT 5 (AC Fun.)						
Non-Minority	119	-	2.82	10.06	10.84	11.55
Black	145	-	2.90	9.76	10.54	10.96
Oriental	2	-	1.50	9.50	12.00	12.50
Am. Ind.	1	-	4.00	18.00	20.00	20.00
Hispanic	11	-	3.00	9.82	10.73	11.09
BAT 6 (AR Fun.)						
Non-Minority	53	-	1.81	5.28	6.02	6.17
Black	60	-	1.97	5.48	5.72	5.92
Oriental	1	-	3.00	11.00	8.00	7.00
Am. Ind.	1	-	4.00	13.00	13.00	13.00
Hispanic	3	-	2.00	7.33	6.67	6.67

TABLE 5

Means By Sex

	Sub Sample Size	Wide Range Scale Score Vocabulary	Wide Range Scale Score Arithmetic	Form A Brief Time	Form B Brief Time	Form B Standard Time
BAT 1 (RV Adv.)						
Male	233	7.49	-	10.20	10.91	11.40
Female	260	7.47	-	10.15	10.86	11.19
BAT 1 (RC Adv.)						
Male	233	7.49	-	7.77	8.42	9.51
Female	260	7.47	-	7.38	8.01	9.15
BAT 2 (AC Adv.)						
Male	282	-	7.15	6.50	5.52	8.09
Female	382	-	7.23	6.93	5.95	8.42
BAT 3 (AR Adv.)						
Male	309	-	7.02	8.21	7.78	8.05
Female	352	-	7.05	7.21	6.61	7.10
BAT 4 (RV Fun.)						
Male	107	2.31	-	8.24	9.04	9.38
Female	102	2.09	-	9.53	9.86	10.15
BAT 4 (RC Fun.)						
Male	107	2.31	-	6.05	6.50	6.91
Female	102	2.09	-	7.12	7.14	7.75
BAT 5 (AC Fun.)						
Male	153	-	2.83	9.69	10.43	11.00
Female	125	-	2.90	10.19	11.07	11.58
BAT 6 (AR Fun.)						
Male	62	-	1.90	5.90	6.05	6.23
Female	56	-	1.95	5.16	5.86	6.00

TABLE 6

Means By Age Group

	Sub Sample Size	Wide Range Scale Score Vocabulary	Wide Range Scale Score Arithmetic	Form A Brief Time	Form B Brief Time	Form B Standard Time
BAT. 1 (RV Adv.)						
Younger than 22	158	7.42	-	9.33	10.27	10.79
22-44	290	7.48	-	10.42	11.04	11.40
Older than 44	45	7.71	-	11.53	12.04	12.36
BAT. 1 (RC Adv.)						
Younger than 22	158	7.42	-	7.98	8.44	9.52
22-44	290	7.48	-	7.43	8.18	9.29
Older than 44	45	7.71	-	6.96	7.47	8.78
BAT. 2 (AC Adv.)						
Yonger than 22	217	-	7.08	6.90	5.81	8.33
22 - 44	399	-	7.25	6.79	5.81	8.30
Older than 44	48	-	7.25	5.60	5.21	7.85
BAT. 3 (AR Adv.)						
Younger than 22	285	-	6.95	7.56	6.82	7.06
22-44	314	-	7.09	7.70	7.31	7.77
Older than 44	62	-	7.11	8.08	7.94	8.60
BAT 4 (RV Fun.)						
Younger than 22	106	2.27	-	9.24	9.72	9.97
22-44	80	2.01	-	8.18	8.70	9.09
Older than 44	23	2.52	-	9.61	10.74	11.09
BAT. 4 (RC Fun.)						
Younger than 22	106	2.27	-	7.07	6.98	7.47
22-44	80	2.01	-	5.91	6.53	7.06
Older than 44	23	2.52	-	6.57	7.04	7.48
BAT. 5 (AC Fun.)						
Younger than 22	108	-	3.19	10.88	11.57	11.92
22-44	141	-	2.67	8.96	9.77	10.36
Older than 44	29	-	2.55	10.97	12.14	13.17
BAT 6 (AR Fun.)						
Younger than 22	50	-	2.14	5.82	6.06	6.26
22-44	53	-	1.81	5.40	5.74	5.85
Older than 44	15	-	1.60	5.20	6.40	6.60

TABLE 7

Means by Economic Status

	Sub Sample Size	Wide Range Scale Score Vocabulary	Wide Range Scale Score Arithmetic	Form A Brief Time	Form B Brief Time	Form B Standard Time
BAT 1 (RV Adv.)						
Non-Disadvantaged	197	7.57	-	10.52	11.21	11.66
Disadvantaged	296	7.42	-	9.95	10.67	11.04
BAT 1 (RC Adv.)						
Non-Disadvantaged	197	7.57	-	8.17	8.85	9.78
Disadvantaged	296	7.42	-	7.17	7.77	9.01
BAT 2 (AC Adv.)						
Non-Disadvantaged	326	-	7.25	7.19	6.10	8.87
Disadvantaged	338	-	7.14	6.31	5.45	7.71
BAT 3 (AR Adv.)						
Non-Disadvantaged	325	-	7.06	8.46	7.99	8.33
Disadvantaged	336	-	7.00	6.92	6.35	6.78
BAT 4 (RV Fun.)						
Non-Disadvantaged	*	*	-	*	*	*
Disadvantaged	*	*	-	*	*	*
BAT 4 (RC Fun.)						
Non-Disadvantaged	*	*	-	*	*	*
Disadvantaged	*	*	-	*	*	*
BAT 5 (AC Fun.)						
Non-Disadvantaged	*	-	*	*	*	*
Disadvantaged	*	-	*	*	*	*
BAT 6 (AR Fun.)						
Non-Disadvantaged	*	-	*	*	*	*
Disadvantaged	*	-	*	*	*	*

*Economic status not required in the design for these batteries.

TABLE 8

CORRELATION MATRIX

Battery I: Reading Vocabulary, Advanced Level

N = 493	Form A Brief Time	Form B Brief Time	Form B Standard Time	Wide Range Scale Score Vocabulary
Form A Brief Time	1.00	.79	.79	.44
Form B Brief Time	.79	1.00	.93	.40
Form B Standard Time	.79	.93	1.00	.39
Wide Range Scale Score Vocabulary	.44	.40	.39	1.00

All Coefficients are Positive and Significant at the .0001 Level

TABLE 9

CORRELATION MATRIX

Battery I: Reading Comprehension, Advanced Level

N = 493	Form A Brief Time	Form B Brief Time	Form B Standard Time	Wide Range Scale Score Vocabulary
Form A Brief Time	1.00	.72	.67	.35
Form B Brief Time	.72	1.00	.88	.33
Form B Standard Time	.67	.88	1.00	.30
Wide Range Scale Score Vocabulary	.35	.33	.30	1.00

All Coefficients are Positive and Significant at the .0001 Level

TABLE 10

CORRELATION MATRIX

Battery II: Arithmetic Computation, Advanced Level

N = 664	Form A Brief Time	Form B Brief Time	Form B Standard Time	Wide Range Scale Score Arithmetic
Form A Brief Time	1.00	.68	.66	.33
Form B Brief Time	.68	1.00	.82	.29
Form B Standard Time	.66	.82	1.00	.36
Wide Range Scale Score Arithmetic	.33	.29	.36	1.00

All Coefficients are Positive and Significant at the .0001 Level

TABLE 11

CORRELATION MATRIX

Battery III: Arithmetic Reasoning, Advanced Level

N = 661	Form A Brief Time	Form B Brief Time	Form B Standard Time	Wide Range Scale Score Arithmetic
Form A Brief Time	1.00	.84	.82	.39
Form B Brief Time	.84	1.00	.97	.39
Form B Standard Time	.82	.97	1.00	.41
Wide Range Scale Score Arithmetic	.39	.39	.41	1.00

All coefficients are Positive and Significant at the .0001 Level

TABLE 12

CORRELATION MATRIX

Battery IV: Reading Vocabulary, Fundamental Level

N = 209	Form A Brief Time	Form B Brief Time	Form B Standard Time	Wide Range Scale Score Vocabulary
Form A Brief Time	1.00	.86	.85	.43
Form B Brief Time	.86	1.00	.97	.45
Form B Standard Time	.85	.97	1.00	.46
Wide Range Scale Score Vocabulary	.43	.45	.46	1.00

All coefficients are positive and significant at the .0001 level

TABLE 13

CORRELATION MATRIX

Battery IV: Reading Comprehension, Fundamental Level

N = 209	Form A Brief Time	Form B Brief Time	Form B Standard Time	Wide Range Scale Score Vocabulary
Form A Brief Time	1.00	.81	.79	.38
Form B Brief Time	.81	1.00	.95	.38
Form B Standard Time	.79	.95	1.00	.36
Wide Range Scale Score Vocabulary	.38	.38	.36	1.00

All coefficients are positive and Significant at the .0001 level

TABLE 14

CORRELATION MATRIX

Battery V: Arithmetic Computation, Fundamental Level

N = 278	Form A Brief Time	Form B Brief Time	Form B Standard Time	Wide Range Scale Score Arithmetic
Form A Brief Time	1.00	.89	.87	.58
Form B Brief Time	.89	1.00	.99	.61
Form B Standard Time	.87	.99	1.00	.60
Wide Range Scale Score Arithmetic	.58	.61	.60	1.00

All Coefficients are Positive and Significant at the .0001 Level

TABLE 15

CORRELATION MATRIX

Battery VI: Arithmetic Reasoning, Fundamental Level

N = 118	Form A Brief Time	Form B Brief Time	Form B Standard Time	Wide Range Scale Score Arithmetic
Form A Brief Time	1.00	.84	.83	.47
Form B Brief Time	.84	1.00	.99	.46
Form B Standard Time	.83	.99	1.00	.45
Wide Range Scale Score Arithmetic	.47	.46	.45	1.00

All Coefficients are Positive and Significant at the .0001 Level

TABLE 16

Correlation Matrix

Total Sample Battery I and Battery IV

N = 702	Form A Read V Brief	Form A Read C Brief	Form B Read V Brief	Form B Read V Stand.	Form B Read C Brief	Form B Read C Stand.
Form A Read V. Brief	1.00	.67	.83	.82	.67	.66
Form A Read C. Brief	.67	1.00	.68	.69	.76	.72
Form B Read V. Brief	.83	.68	1.00	.95	.67	.67
Form B Read V. Standard	.82	.69	.95	1.00	.68	.70
Form B Read C. Brief	.67	.76	.67	.68	1.00	.91
Form B Read C. Standard	.66	.72	.67	.70	.91	1.00

All Coefficients are Positive and Significant at the .0001 Level.

TABLE 17

Analysis of Variance

(AGE * SEX * ETHNIC * Economic Status) Battery I - Battery III

(AGE * SEX * ETHNIC) Battery IV - Battery VI

OVERALL SIGNIFICANCE LEVEL

	Brief Time		Standard Time		Brief/Standard Differences	
	F Value	Sig.	F Value	Sig.	F Value	Sig.
BAT 1 RV Adv.	3.20	.0001	3.07	.0001	1.77	.0029
BAT 1 RC Adv.	2.77	.0001	2.86	.0001	1.38	.0601
BAT 2 AC Adv.	2.99	.0001	2.93	.0001	1.45	.0381
BAT 3 AR Adv.	4.53	.0001	3.88	.0001	2.67	.0001
BAT 4 RV Fun.	.96	.5078	1.09	.3596	2.64	.0003
BAT 4 RC Fun.	.97	.4987	1.08	.3722	.77	.7422
BAT 5 AC Fun	1.60	.0557	1.67	.0415	1.57	.0637
BAT 6 AR Fun.	.64	.8356	.59	.8806	1.29	.2224

TABLE 18

ANOVA (Type IV Sums of Squares)

Battery I: Reading Vocabulary, Advanced Level

Source:	Brief Time		Standard Time		Brief/Standard Differences	
	F-Value	Sig.	F-Value	Sig.	F-Value	Sig.
AGE	5.42	.0047	4.79	.0088	.77	.4648
SEX	2.07	.1508	2.35	.1257	.03	.8715
AGE*SEX	.70	.4955	.24	.7853	1.34	.2639
ETHNIC	8.12	.0001	5.40	.0013	4.85	.0027
AGE*ETHNIC	1.99	.0776	2.66	.0218	1.41	.2178
SEX*ETHNIC	1.72	.1613	1.84	.1376	1.45	.2271
AGE*SEX*ETHNIC	.46	.8097	.39	.8549	.56	.7336
ECONDIS	.67	.4136	.85	.3559	.05	.8239
AGE*ECONDIS	4.06	.0180	2.84	.0594	1.05	.3524
SEX*ECONDIS	.06	.8083	.03	.8519	.02	.8772
AGE*SEX*ECONDIS	.52	.5935	.05	.9465	2.00	.1372
ETHMIN*ECONDIS	.32	.8154	.33	.8030	.07	.9702
AGE*SEX*ECONDIS	2.22	.0508	2.94	.0127	1.08	.3731
SEX*ETHMIN*ECONDIS	.97	.4094	.90	.4425	.05	.9792
AGE*SEX* ETHMIN*ECONDIS	.73	.5696	.88	.4786	.62	.6469

TABLE 19

ANOVA (Type IV Sums of Squares)

Battery I: Reading Comprehension, Advanced Level

Source:	Brief Time		Standard Time		Brief/Standard Differences	
	F-Value	Sig.	F-Value	Sig.	F-Value	Sig.
AGE	3.59	.0285	1.91	.1494	1.58	.2074
SEX	3.16	.0762	2.82	.0939	.25	.6183
AGE*SEX	1.75	.1751	1.46	.2337	.78	.4585
ETHNIC	6.96	.0002	4.90	.0025	1.66	.1742
AGE*ETHNIC	1.66	.1424	2.76	.0181	1.69	.1343
SEX*ETHNIC	1.98	.1151	3.21	.0228	1.46	.2247
AGE*SEX*ETHNIC	.41	.8414	.73	.6019	1.49	.1889
ECONDIS	4.99	.0259	5.22	.0227	.10	.7526
AGE*ECONDIS	.06	.9462	.23	.7966	.73	.4836
SEX*ECONDIS	1.84	.1752	2.08	.1503	.01	.9211
AGE*SEX*ECONDIS	.47	.6273	1.40	.2480	.64	.5292
ETHMIN*ECONDIS	.24	.8699	.57	.6395	1.11	.3437
AGE*SEX*ECONDIS	1.49	.1889	1.46	.1993	.98	.4321
SEX*ETHMIN*ECONDIS	.08	.9648	.55	.6535	.93	.4282
AGE*SEX* ETHMIN*ECONDIS	.52	.7247	.45	.7758	1.35	.2505

TABLE 20

ANOVA (Type IV Sums of Squares)

Battery II: Arithmetic Computation (Advanced Level)

Source:	Brief Time		Standard Time		Brief/Standard Differences	
	F-Value	Sig.	F-Value	Sig.	F-Value	Sig.
AGE	1.63	.1976	1.46	.2341	.12	.8907
SEX	.77	.3800	.32	.5747	.16	.6867
AGE*SEX	.29	.7467	.28	.7589	.46	.6341
ETHNIC	8.53	.0001	6.75	.0001	.86	.4879
AGE*ETHNIC	.29	.9587	1.18	.3127	1.89	.0684
SEX*ETHNIC	3.44	.0166	1.14	.3307	1.33	.2640
AGE*SEX*ETHNIC	1.97	.0979	2.35	.0529	1.20	.3099
ECONDIS	.08	.7818	1.08	.2990	1.66	.1985
AGE*ECONDIS	.04	.9633	.04	.9602	.34	.7130
SEX*ECONDIS	.02	.8874	.13	.7203	.14	.7086
AGE*SEX*ECONDIS	2.22	.1090	3.04	.0485	.39	.6753
ETHMIN*ECONDIS	.92	.3987	.52	.5960	.50	.6059
AGE*SEX*ECONDIS	.94	.4385	1.14	.3351	.55	.7001
SEX*ETHMIN*ECONDIS	.01	.9899	.03	.9700	.17	.8447
AGE*SEX* ETHMIN*ECONDIS	.67	.5765	.46	.7154	.69	5651

TABLE 21

ANOVA (Type IV Sums of Squares)

Battery III: Arithmetic Reasoning; Advanced Level

Source:	Brief Time		Standard Time		Brief/Standard Differences	
	F-Value	Sig.	F-Value	Sig.	F-Value	Sig.
AGE	2.00	.1368	2.36	.0953	2.40	.0919
SEX	3.75	.0532	2.40	.1220	2.44	.1191
AGE*SEX	.53	.5900	.79	.4526	2.57	.0774
ETHNIC	9.56	.0001	6.43	.0001	8.42	.0001
AGE*ETHNIC	1.35	.2332	.91	.4885	1.38	.2206
SEX*ETHNIC	.17	.9140	.17	.9131	1.41	.2366
AGE*SEX*ETHNIC	.16	.9575	.36	.8384	1.43	.2218
ECONDIS	10.31	.0014	8.46	.0038	1.69	.1937
AGE*ECONDIS	1.29	.2767	1.00	.3696	2.56	.0780
SEX*ECONDIS	.07	.7873	.12	.7346	5.27	.0221
AGE*SEX*ECONDIS	3.18	.0421	2.67	.0702	3.20	.0414
ETHMIN*ECONDIS	.76	.5495	.65	.6270	.82	.5136
AGE*SEX*ECONDIS	.08	.9631	.12	.9440	2.14	.0925
SEX*ETHMIN*ECONDIS	.90	.4079	.62	.5385	5.55	.0041
AGE*SEX* ETHMIN*ECONDIS	.51	.6013	.72	.4880	.39	.6795

TABLE 22

ANOVA (Type IV Sums of Squares)

Battery IV: Reading Vocabulary, Fundamental Level

Source:	Brief Time		Standard Time		Brief/Standard Differences	
	F-Value	Sig.	F-Value	Sig.	F-Value	Sig.
AGE	1.05	.3519	.76	.4693	1.79	.1695
SEX	.84	.3605	.83	.3627	.00	.9475
AGE*SEX	.21	.8112	.22	.8020	.08	.9233
ETHNIC	1.44	.2227	1.18	.3222	5.07	.0007
AGE*ETHNIC	.67	.6505	1.09	.3672	4.17	.0014
SEX*ETHNIC	.01	.9962	.02	.9921	.32	.8155
AGE*SEX*ETHNIC	.54	.6586	.51	.6781	.62	.6062

TABLE 23

ANOVA (Type IV Sums of Squares)

Battery IV: Reading Comprehension, Fundamental Level

Source:	Brief Time		Standard Time		Brief/Standard Differences	
	F-Value	Sig.	F-Value	Sig.	F-Value	Sig.
AGE	.84	.4316	.43	.6482	1.20	.3049
SEX	1.45	.2308	2.97	.0863	2.30	.1308
AGE*SEX	.53	.5890	.65	.5239	.04	.9574
ETHNIC	.67	.6129	.72	.5793	.92	.4548
AGE*ETHNIC	1.85	.1032	1.69	.1367	1.17	.3260
SEX*ETHNIC	.25	.8594	.25	.8597	.81	.4927
AGE*SEX*ETHNIC	.50	.6880	.28	.8429	.51	.6817

TABLE 24

ANOVA (Type IV Sums of Squares)

Battery V: Arithmetic Computation, Fundamental Level

Source:	Brief Time		Standard Time		Brief/Standard Differences	
	F-Value	Sig.	F-Value	Sig.	F-Value	Sig.
AGE	4.91	.0081	5.07	.0069	1.33	.2653
SEX	.00	.9486	.00	.9543	.00	.9622
AGE*SEX	1.03	.3590	.72	.4878	1.82	.1643
ETHNIC	.77	.5462	.81	.5183	.78	.5401
AGE*ETHNIC	1.52	.1981	1.37	.2457	.91	.4609
SEX*ETHNIC	.65	.5253	.40	.6695	1.52	.2210
AGE*SEX*ETHNIC	4.62	.0038	4.86	.0028	.39	.7670

TABLE 25

ANOVA (Type IV Sums of Squares)

Battery VI: Arithmetic Reasoning, Fundamental Level

Source:	Brief Time		Standard Time		Brief/Standard Differences	
	F-Value	Sig.	F-Value	Sig.	F-Value	Sig.
AGE	.14	.8721	.13	.8776	.78	.4633
SEX	1.27	.2622	.80	.3730	2.57	.1119
AGE*SEX	.32	.7264	.12	.8869	2.52	.0851
ETHNIC	.99	.4154	.82	.5180	.95	.4402
AGE*ETHNIC	.97	.3825	.85	.4284	.13	.8752
SEX*ETHNIC	1.10	.3355	1.05	.3530	2.67	.0741
AGE*SEX*ETHNIC	.04	.9643	.02	.9767	1.14	.3224

TABLE 26

Duncan Multiple Range Test (ETHNIC)

Battery I; Reading Vocabulary, Advanced Level

		Non-Min.	Black	Oriental	American Indian	Hispanic
	Stand-Brief Diff. Mean	.25	.73	*	.00	.24
Non-Min.	.25	-	SIG	*	NS	NS
Black	.73	SIG	-	*	SIG	SIG
Oriental	*	*	*	-	*	*
Am. Indian	.00	NS	SIG	*	-	NS
Hispanic	.24	NS	SIG	*	NS	-

*No Orientals in Sample

Mean Differences Noted SIG are Based on .05 Level

TABLE 27

Duncan Multiple Range Test (ETHNIC)

	Stand-Brief Diff. Mean	Non-Min.	Black	Oriental	American Indian	Hispanic
	Stand-Brief Diff. Mean	.97	1.35	*	.64	1.10
Non-Min.	.97	-	SIG	*	NS	NS
Black	1.35	SIG	-	*	SIG	NS
Oriental	*	*	*	-	*	*
Am. Indian	.64	NS	SIG	*	-	NS
Hispanic	1.10	NS	NS	*	NS	-

* No Orientals In Sample.

Means Differences Noted as SIG are at the .05 Level.

TABLE 28

Duncan Multiple Range Test (ETHNIC)

Battery II; Arithmetic Computation, Advanced Level

		Non-Min.	Black	Oriental	American Indian	Hispanic
	Stand-Brief Diff. Mean	2.49	2.43	1.50	1.33	3.07
Non-Min.	2.49	-	NS	NS	NS	SIG
Black	2.43	NS	-	NS	NS	SIG
Oriental	1.50	NS	NS	-	NS	SIG
Am. Indian	1.33	NS	NS	NS	-	SIG
Hispanic	3.07	SIG	SIG	SIG	SIG	-

Mean differences noted SIG are based on .05 level.

TABLE 29

Duncan Multiple Range Test (ETHNIC)

Battery III; Arithmetic Reasoning, Advanced Level

		Non-Min.	Black	Oriental	American Indian	Hispanic
	Stand-Brief Diff. Mean	.25	.61	.18	.58	.60
Non-Min.	.25	-	SIG	NS	NS	SIG
Black	.61	SIG	-	SIG	NS	NS
Oriental	.18	NS	SIG	-	NS	SIG
Am. Indian	.58	NS	NS	NS	-	NS
Hispanic	.60	SIG	NS	SIG	NS	-

Mean differences noted SIG are based on .05 level.

TABLE 30

Duncan Multiple Range Test (ETHNIC)

Battery IV; Reading Vocabulary, Fundamental Level

	Stand-Brief Diff. Mean	Non. Min.	Black	Oriental	American Indian	Hispanic
		.48	.29	.00	-1.33	-.17
Non-Min.	.48	-	NS	NS	SIG	SIG
Black	.29	NS	-	NS	SIG	NS
Oriental	.00	NS	NS	-	NS	NS
Am. Indian	-1.33	SIG	SIG	NS	-	NS
Hispanic	-.17	SIG	NS	NS	NS	-

Mean differences noted as SIG are based on .05 level.

TABLE 31

Duncan Multiple Range Test (ETHNIC)

Battery IV; Reading Comprehension, Fundamental Level

		Non-Min.	Black	Oriental	American Indian	Hispanic
	Stand-Brief Diff. Mean	.67	.40	1.00	-.33	.42
Non-Min.	.67	-	NS	NS	NS	NS
Black	.40	NS	-	NS	NS	NS
Oriental	1.00	NS	NS	-	NS	NS
Am. Indian	-.33	NS	NS	NS	-	NS
Hispanic	.42	NS	NS	NS	NS	-

Mean differences noted as SIG are based on .05 level.

TABLE 32

Duncan Multiple Range Test (ETHNIC)

Battery V; Arithmetic Computation, Fundamental Level

	Stand-Brief Diff. Mean	Non-Min.	Black	Oriental	American Indian	Hispanic
	Stand-Brief Diff. Mean	.71	.42	.50	.00	.36
Non-Min.	.71	-	SIG	NS	SIG	SIG
Black	.42	SIG	-	NS	NS	NS
Oriental	.50	NS	NS	-	NS	NS
Am. Indian	.00	SIG	NS	NS	-	NS
Hispanic	.36	SIG	NS	NS	NS	-

Mean Differences noted as SIG are based on .05 Level.

TABLE 33

Duncan Multiple Range Test (ETHNIC)

Battery VI; Arithmetic Reasoning, Fundamental Level

	Stand-Brief Diff. Mean	Non-Min. .15	Black .20	Oriental -1.00	American Indian .00	Hispanic .00
Non-Min.	.15	-	NS	NS	NS	NS
Black	.20	NS	-	SIG	NS	NS
Oriental	-1.00	NS	SIG	-	NS	NS
Am. Indian	.00	NS	NS	NS	-	NS
Hispanic	.00	NS	NS	NS	NS	-

Mean Differences Noted SIG are based on .05 Level

TABLE 34

t - Test

Significance of Difference Between Means

	Form B Brief	Form B Stand.	Difference Between Means	t *	Sig. Level **
BAT 1 (RV Adv.)	10.88	11.29	.41	2.38	.01
BAT 1 (RC Adv.)	8.20	9.32	1.12	6.77	.0005
BAT 2 (AC Adv.)	5.77	8.28	2.51	14.51	.0005
BAT 3 (AR Adv.)	7.16	7.54	.38	2.03	.025
BAT 4 (RV Fun.)	9.44	9.76	.32	.84	<.10
BAT 4 (RC Fun.)	6.81	7.32	.51	1.48	.10
BAT 5 (AC Fun.)	10.72	11.26	.54	1.03	<.10
BAT 6 (AR Fun.)	5.96	6.12	.16	.33	<.10

*Formula for Calculating t assuming unknown but equal population variance.

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left(\frac{(N_1-1)s_1^2 + (N_2-1)s_2^2}{(N_1-1) + (N_2-1)}\right)\left(\frac{1}{N_1}\right) + \left(\frac{(N_1-1)s_1^2 + (N_2-1)s_2^2}{(N_1-1) + (N_2-1)}\right)\left(\frac{1}{N_2}\right)}}$$

** Significant Levels Established at .05 one tail.